



Roy F Weston, Inc  
Suite 5700  
700 5th Avenue  
Seattle, WA 98104-5057  
206-521-7600 • Fax 206-521-7601  
[www.rfweston.com](http://www.rfweston.com)

## MEMORANDUM

DATE: 11 January 1999  
TO: David Bennett, WAM, U S. EPA, Region X  
FROM: Michelle Turner, Chemist, WESTON, Seattle  
        Roger McGinnis, Senior Environmental Chemist, WESTON, Seattle

SUBJECT: Validation of Inorganics Data  
Laboratory Batch K9806584  
Site: Duwamish River

WORK ASSIGNMENT NO : 46-23-0JZZ

WORK ORDER NO.: 4000-019-038-5200-00

DOC. CONTROL NO.: 4000-019-038-AAAK

cc: Bruce Woods, RAP-WAM, U.S. EPA, Region X  
Dena Hughes, Site Manager, WESTON, Seattle (memo only)  
Kevin Mundell-Jackson, Database Management, WESTON, Seattle

The quality assurance review of fifteen sediment samples, laboratory batch K9806584, collected from the Duwamish River has been completed. The sediment samples were analyzed for inorganics by Columbia Analytical Services of Kelso, Washington using EPA Methods 200, 6010, 6020, and 7000 series as required to achieve detection limit goals. The samples were numbered:

98394020	98394021	98394022	98394023	98394024
98394025	98394026	98394027	98394028	98394029
98394030	98394031	98394032	98394033	98394034

### Data Qualifications

The following comments refer to the laboratory performance in meeting the quality control criteria described in the technical specifications of the laboratory subcontract. The review

This document was prepared by Roy F Weston, Inc expressly for the EPA. It shall not be disclosed in whole or in part without the express, written permission of the EPA.





QA Review Batch K9806584 (Inorganics/Metals)

Site Duwamish River

Page 2

follows the format described in the U.S. EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA OSWER 9240.1-05-01, February 1994) modified to include specific requirements of the analytical methods.

## 1 Holding Times

Holding times of 28 days for mercury and six months for other metals (from date of collection to analysis) were established in the project Sampling and Analysis Plan. All samples met holding time criteria.

## 2. Calibration

### a) Initial Calibration

Initial calibration frequencies and QC criteria were met for ICP and ICP/MS analyses

Mass calibration for all ICP/MS internal standards was within 0.1 atomic mass unit of the true mass. ICP/MS resolution was less than 0.9 amu full width at 10 percent peak height.

### b) CRI/CRA Standards

Instrument calibration was verified using low level standards near the project required detection limit.

### c) Initial and Continuing Calibration Verification

All inductively coupled plasma (ICP) and ICP/MS results met control limits of 90 to 110 percent recovery (percent R) of the true values for both initial and continuing calibration

Mercury cold vapor AA (CVAA) results met control limits of 80 to 120 percent recovery (percent R) for both initial and continuing calibration.

## 3. Instrument Detection Limits

All instrument detection limits (IDL) for ICP, ICP/MS, and mercury analyses met project requirements specified in the project Sampling and Analysis Plan

This document was prepared by Roy F. Weston, Inc. expressly for the EPA. It shall not be disclosed in whole or in part without the express, written permission of the EPA.



QA Review Batch K9806584 (Inorganics/Metals)

Site: Duwamish River

Page 3

4 Blanks

a) Laboratory Method Blanks

The following analytes were detected in laboratory method blanks.

Blank ID	Analyte	Concentration	Associated Samples
K9806584-MB	Lead	1.21 mg/Kg	98394020 through 98394034
K9806584-MB	Tin	0.6 mg/Kg	98394020 through 98394034

Results for analytes listed above were qualified as undetected (UJ) if concentrations in associated samples were less than five times the concentration present in the blank.

b) Initial Calibration and Continuing Calibration Blanks

The following elements were found in calibration blanks.

Blank ID	Analyte	Concentration	Associated Samples
CCB1	Nickel	0.06 ug/L	98394020 through 98394022 98394028
CCB1	Thallium	0.03 ug/L	98394020 through 98394022 98394028
CCB2	Arsenic	0.2 ug/L	98394023 through 98394025 98394030 through 98394034
CCB2	Cadmium	0.02 ug/L	98394023 through 98394025 98394030 through 98394034
CCB3	Cadmium	0.04 ug/L	98394026 through 98394029
CCB3	Selenium	0.4 ug/L	98394026 through

This document was prepared by Roy F. Weston, Inc. expressly for the EPA. It shall not be disclosed in whole or in part without the express, written permission of the EPA.



QA Review Batch K9806584 (Inorganics/Metals)

Site. Duwamish River

Page 4

Blank ID	Analyte	Concentration	Associated Samples
			98394029
CCB4	Cadmium	0.04 ug/L	none
CCB4	Selenium	0.6 ug/L	none

Results for analytes listed above were qualified as undetected (UJ) if concentrations in associated samples were less than five times the concentration present in the blank.

c) Field Blanks

No field blank samples were associated with this laboratory batch

5. ICP and ICP/MS Interference Check

All analytes for the interference check samples were within the control limits of 80 to 120 percent of the true values. Internal standard intensities for analytes determined by ICP/MS were within  $\pm$  20 percent of the initial calibration intensity.

6. Laboratory Control Sample

Laboratory control sample recoveries were within the control for all analytes.

7. Laboratory Duplicate Sample Analysis

Relative percent differences (RPD) between analytical results were within the QC limit of 35 percent (or  $\pm$  2 times the quantitation limit for concentrations < 5 times the quantitation limit).

8. Spiked Sample Analysis

The matrix spike recoveries for the following analytes were outside QC limits:

This document was prepared by Roy F. Weston, Inc. expressly for the EPA. It shall not be disclosed in whole or in part without the express, written permission of the EPA.



QA Review Batch K9806584 (Inorganics/Metals)

Site: Duwamish River

Page 5

Sample	Analyte	Percent Recovery	QC Limits
98394028	Antimony	32	75-125

In addition, as the native sample concentrations for Aluminum and Iron exceeded the spike concentration by more than 4 times, recoveries were not calculated. Data were not qualified solely on matrix spike results.

9 ICP and ICP/MS Serial Dilution

Serial dilutions were not routinely performed for this SDG.

10. ICP/MS Quality Control

a) Duplicate Analysis

Duplicate analyses were not performed for this SDG

b) Post Digest Spike Recovery

Post digest spikes were not performed for this SDG

c) Method of Standard Additions

No samples required MSA analysis.

d) ICP/MS Internal Standards

The intensity of all internal standards was within limits of 30 to 120 percent of the initial calibration intensity for all samples except the following:

Sample	Standard	% Intensity
98394028	Yttrium	127.5
98394028RE	Yttrium	124.2
98394020	Yttrium	121.6
98394021	Yttrium	128.5

This document was prepared by Roy F. Weston, Inc. expressly for the EPA. It shall not be disclosed in whole or in part without the express, written permission of the EPA.



## QA Review Batch K9806584 (Inorganics/Metals)

Site: Duwamish River

Page 6

Sample	Standard	% Intensity
98394021RE	Yttrium	122 7
98394030	Yttrium	126 1
98394031	Yttrium	124 6

Samples were diluted and reanalyzed as required.

Results and quantitation limits for samples 98394028 and 98394021 were qualified as estimated (J) as reanalysis results remained outside the QC limits.

### 10. Field Duplicate Analysis

Samples 98394027 and 98394029 were field duplicates. The relative percent difference between duplicate results was within limits of 35 percent RPD for all analytes except:

Analyte	Initial Result	Duplicate Result	% RPD
Cadmium	0 43	0 26	49 3
Lead	29 2	14 6	66 7

Results for the analytes listed above were qualified as estimated (J) in samples 98394027 and 98394029.

Samples 98394028 and 98394030 were also field duplicates. The relative percent difference between duplicate results was within limits of 35 percent RPD for all analytes.

### 11. Sample Analysis

A cursory raw data review was performed. All laboratory deliverables were present and complete. The case narrative indicated that the MS recovery of Antimony in sample 98394028 was outside the QC limits due to matrix effects. As associated QC was in control, no further action was taken. Also, the MS recovery of Aluminum and Iron were not calculated as the sample concentration was significantly higher than the added spike concentration. Also, the Method Blank contained Lead at levels above the reporting limit. No other problems were noted.

This document was prepared by Roy F. Weston, Inc. expressly for the EPA. It shall not be disclosed in whole or in part without the express, written permission of the EPA.



QA Review Batch K9806584 (Inorganics/Metals)

Site: Duwamish River

Page 7

## 12. Laboratory Contact

No laboratory contact was required.

## Data Assessment

Upon consideration of the data qualifications noted above, the data are ACCEPTABLE for use except where flagged with data qualifiers that modify the usefulness of the individual values.

## Data Qualifiers

U - The material was analyzed for, but was not detected.

UJ - The analyte was not detected. The associated quantitation limit is an estimate because quality control criteria were not met.

J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported were less than the CRDL or lowest calibration standard.

R - Quality control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/22/98  
**Date Received:** 9/23/98

**Total Metals**

Sample Name	98394020	Units	mg/Kg (ppm)
Lab Code	K9806584-001	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	21500	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WJ
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	8	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	83	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 42	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 57	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5820	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	24	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	45	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	27800	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	34 2	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	7620	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	295	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 2	J
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	18 0	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2900	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 6	J
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 66	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	11700	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 13	J
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	4	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	61	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	120	

Approved By \_\_\_\_\_

1544mc/031695

06584ICP FA1 Sample 11/12/98

*JC* Date 11/12/98

00008

11/12/98

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/22/98  
**Date Received:** 9/23/98

**Total Metals**

<b>Sample Name</b>	98394021	<b>Units</b>	mg/Kg (ppm)
<b>Lab Code</b>	K9806584-002	<b>Basis</b>	Dry
<b>Test Notes</b>			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	22300	J
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	uJ
Arsenic	EPA 3050B	200 8	1	0.2	10	11/6/98	11/9/98	7	J
Barium	EPA 3050B	6010B	1	0.6	2	11/6/98	11/10/98	73	
Beryllium	EPA 3050B	200 8	0.04	0.04	10	11/6/98	11/9/98	0.39	
Cadmium	EPA 3050B	200 8	0.04	0.04	10	11/6/98	11/9/98	0.39	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5850	
Chromium	EPA 3050B	6010B	2	0.7	2	11/6/98	11/10/98	29	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	50	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	28600	
Lead	EPA 3050B	200 8	0.04	0.008	10	11/6/98	11/9/98	31 6	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	8110	
Manganese	EPA 3050B	6010B	1	0.4	2	11/6/98	11/10/98	282	
Mercury	EPA 3050B	7471A	0.2	0.02	1	10/19/98	10/21/98	0.2	
Nickel	EPA 3050B	200 8	0.5	0.04	10	11/6/98	11/9/98	19 9	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	3100	
Selenium	EPA 3050B	200 8	2	0.6	10	11/6/98	11/9/98	ND	uJ
Silver	EPA 3050B	200 8	0.04	0.008	10	11/6/98	11/9/98	0.33	J
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	10700	J
Thallium	EPA 3050B	200 8	0.04	0.01	10	11/6/98	11/9/98	0.07	J
Tin	EPA 3050B	200 8	4	0.2	10	11/6/98	11/9/98	5	
Vanadium	EPA 3050B	6010B	2	0.6	2	11/6/98	11/10/98	65	
Zinc	EPA 3050B	6010B	2	0.8	2	11/6/98	11/10/98	113	

(J)

10/13/98

Approved By

1N44mc/031095  
 06584IC P.F.A.T. Sample (2) 11/12/98

Date 11/12/98

00009

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/22/98  
**Date Received:** 9/23/98

**Total Metals**

Sample Name	98394022	Units	mg/Kg (ppm)
Lab Code	K9806584-003	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	22100	WT
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	
Arsenic	EPA 3050B	200 8	1	0.2	10	11/6/98	11/9/98	8	
Barium	EPA 3050B	6010B	1	0.6	2	11/6/98	11/10/98	91	
Beryllium	EPA 3050B	200 8	0.04	0.04	10	11/6/98	11/9/98	0.41	
Cadmium	EPA 3050B	200 8	0.04	0.04	10	11/6/98	11/9/98	0.74	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	6150	
Chromium	EPA 3050B	6010B	2	0.7	2	11/6/98	11/10/98	30	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	9	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	53	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	28600	
Lead	EPA 3050B	200 8	0.04	0.008	10	11/6/98	11/9/98	48.2	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	7020	
Manganese	EPA 3050B	6010B	1	0.4	2	11/6/98	11/10/98	276	
Mercury	EPA 3050B	7471A	0.2	0.02	1	10/19/98	10/21/98	0.2	
Nickel	EPA 3050B	200 8	0.5	0.04	10	11/6/98	11/9/98	17.6	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2600	
Selenium	EPA 3050B	200 8	2	0.6	10	11/6/98	11/9/98	ND	
Silver	EPA 3050B	200 8	0.04	0.008	10	11/6/98	11/9/98	0.54	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	5870	
Thallium	EPA 3050B	200 8	0.04	0.01	10	11/6/98	11/9/98	0.10	J
Tin	EPA 3050B	200 8	4	0.2	10	11/6/98	11/9/98	6	
Vanadium	EPA 3050B	6010B	2	0.6	2	11/6/98	11/10/98	65	
Zinc	EPA 3050B	6010B	2	0.8	2	11/6/98	11/10/98	120	

10/21/98

Approved By

FSA4mc/031695

065M4C PFA1 Sample (3) 11/12/98

JK

Date 11/12/98

Print No  
00010

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/22/98  
**Date Received:** 9/23/98

## Total Metals

Sample Name	98394023	Units	mg/Kg (ppm)
Lab Code	K9806584-004	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	20900	UC
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	
Arsenic	EPA 3050B	200 8	1	0.2	10	11/6/98	11/9/98	14	
Barium	EPA 3050B	6010B	1	0.6	2	11/6/98	11/10/98	152	
Beryllium	EPA 3050B	200 8	0.04	0.04	10	11/6/98	11/9/98	0.37	
Cadmium	EPA 3050B	200 8	0.04	0.04	10	11/6/98	11/9/98	0.94	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	6790	
Chromium	EPA 3050B	6010B	2	0.7	2	11/6/98	11/10/98	38	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	9	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	86	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	31000	
Lead	EPA 3050B	200 8	0.04	0.008	10	11/6/98	11/9/98	110	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	7770	
Manganese	EPA 3050B	6010B	1	0.4	2	11/6/98	11/10/98	249	
Mercury	EPA 3050B	7471A	0.2	0.02	1	10/19/98	10/21/98	0.3	
Nickel	EPA 3050B	200 8	0.5	0.04	10	11/6/98	11/9/98	18.6	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	3100	
Selenium	EPA 3050B	200 8	2	0.6	10	11/6/98	11/9/98	0.8	
Silver	EPA 3050B	200 8	0.04	0.008	10	11/6/98	11/9/98	0.94	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	14000	
Thallium	EPA 3050B	200 8	0.04	0.01	10	11/6/98	11/9/98	0.13	
Tin	EPA 3050B	200 8	4	0.2	10	11/6/98	11/9/98	21	
Vanadium	EPA 3050B	6010B	2	0.6	2	11/6/98	11/10/98	61	
Zinc	EPA 3050B	6010B	2	0.8	2	11/6/98	11/10/98	171	

(J)

Approved By \_\_\_\_\_ *[Signature]* Date 11/12/98

1544mc/031695

06584ICP FA1 Sample (4) 11/12/98

Page No  
00011

1971379

## COLUMBIA ANALYTICAL SERVICES, INC

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

## Total Metals

Sample Name	98394030	Units	mg/Kg (ppm)
Lab Code	K9806584-005	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	18800	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WT
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	9	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	69	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 39	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 31	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	4890	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	24	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	44	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	27000	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	17 6	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	6520	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	269	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 2	
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	18 3	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2200	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 9	
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 16	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	5380	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 10	
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	4	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	69	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	70	

E

Estimated concentration, see case narrative

NAT 1/3/99

Approved By

154mc/031695  
06 SR4ICP FA1 Sample (S) 11/12/98

Date

11/12/98

Page No  
00012

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

**Total Metals**

Sample Name	98394031	Units	mg/Kg (ppm)
Lab Code	K9806584-006	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	23400	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WT
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	10	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	79	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 42	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 35	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	6110	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	30	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	47	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	30700	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	25 3	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	8130	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	320	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 2	J
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	22	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2900	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 7	
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 22	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	11200	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 08	
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	5	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	70	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	103	

WT, J, 11/12/98

Approved By \_\_\_\_\_  
 1844INC/031095  
 06584IC P1 A1 Sample (6) 11/12/98

*JK* Date 11/12/98

Page No  
 00013

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

## Total Metals

Sample Name	98394032	Units	mg/Kg (ppm)						
Lab Code	K9806584-007	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	21900	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WT
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	10	
Barnum	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	81	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 40	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 48	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5670	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	28	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	46	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	28500	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	33 4	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	7420	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	280	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 2	J
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	18 9	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2800	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 7	
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 41	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	10700	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 08	
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	4	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	64	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	106	

Approved By

1544mc/031o95

06584IC P EAT Sample (7) 11/12/98

Date 11/12/98

WT 1/3/99

00014

## COLUMBIA ANALYTICAL SERVICES, INC

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

## Total Metals

Sample Name	98394033	Units	mg/Kg (ppm)						
Lab Code	K9806584-008	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	20400	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WT
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	8	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	78	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 38	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 33	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5930	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	27	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	50	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	27400	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	26 7	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	7690	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	289	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 1	J
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	20	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2800	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 9	
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 22	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	10900	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 07	
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	6	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	62	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	101	

WT J J

WT 13%

Approved By

LN44mc/031695

06554K P EAI Sample (8) 11/12/98

Date

11/12/98

00015

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

## Total Metals

Sample Name	98394034	Units	mg/Kg (ppm)
Lab Code	K9806584-009	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	20700	WT
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	10	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	93	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 38	
Cadmum	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 51	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5540	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	26	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	52	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	28000	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	38 4	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	7520	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	283	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 2	J
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	16 9	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2900	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 8	
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 44	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	11100	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 07	
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	5	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	62	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	115	

Approved By

154400/031695

06584IC P EAT Sample (9) 11/12/98

*JL*

Date 11/12/98

00016

*WT/3KA*

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/22/98  
**Date Received:** 9/24/98

## Total Metals

Sample Name	98394024	Units	mg/Kg (ppm)
Lab Code	K9806584-010	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	21000	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WT
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	12	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	181	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 40	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	1 34	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	6700	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	55	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	79	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	29900	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	75 4	
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	8240	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	266	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 5	
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	19 9	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	3200	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	1	J
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	1 67	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	11700	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 11	
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	21	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	69	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	143	

Approved By

IS44mc/031695

06584ICP EA1 Sample (10) 12/4/98

*EW*Date *12/7/98*

00017

*NGT 13/99*

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

**Total Metals**

Sample Name	98394025	Units	mg/Kg (ppm)
Lab Code	K9806584-011	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	17200	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WJ
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	6	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	72	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 34	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 22	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	4900	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	22	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	9	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	30	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	23700	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	13 4	J
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	6380	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	311	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 1	
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	18 3	(J)
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	1800	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 7	(J)
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 10	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	6610	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 03	(J)
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	3	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	54	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	68	

E

Estimated concentration, see case narrative

mg/1359

Approved By

1544mc/031695

06584IC PCAI Sample (1) 11/12/98

SP

Date

11/12/98

00018

## COLUMBIA ANALYTICAL SERVICES, INC.

## Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

## Total Metals

Sample Name	98394026	Units	mg/Kg (ppm)
Lab Code	K9806584-012	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	17400	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WJ
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	5	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	73	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 38	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 35	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5260	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	20	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	8	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	26	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	24400	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	15 7	J
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	6040	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	279	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 1	
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	15 0	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	1700	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	ND	
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 22	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	4170	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 03	J
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	3	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	57	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	76	

E

Estimated concentration, see case narrative

10/13/98

Approved By

1544me/031695

06584K P.F.A. Sample (12) 11/12/98

Date 11/12/98

00019<sup>10</sup>

**COLUMBIA ANALYTICAL SERVICES, INC**

**Analytical Report**

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

**Total Metals**

<b>Sample Name</b>	98394027	<b>Units</b>	mg/Kg (ppm)
<b>Lab Code</b>	K9806584-013	<b>Basis</b>	Dry
<b>Test Notes</b>			

<b>Analyte</b>	<b>Prep Method</b>	<b>Analysis Method</b>	<b>MRL</b>	<b>MDL</b>	<b>Dilution Factor</b>	<b>Date Extracted</b>	<b>Date Analyzed</b>	<b>Result</b>	<b>Notes</b>
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	18100	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	UJ
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	9	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	72	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 45	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 43	J
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5000	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	26	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	9	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	41	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	26600	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	29 2	J
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	6510	
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	276	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 2	
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	18 5	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2300	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 9	
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 22	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	7370	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 07	
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	4	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	66	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	79	

(J)

10/21/98

Approved By \_\_\_\_\_

ES44mc/031695

06584ICP EA1 Sample #3 11/12/98

*[Signature]*

Date 11/12/98

000.20

**COLUMBIA ANALYTICAL SERVICES, INC.**

**Analytical Report**

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

**Total Metals**

Sample Name	98394028	Units	mg/Kg (ppm)
Lab Code	K9806584-014	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	20100	J
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	WJ
Arsenic	EPA 3050B	200 8	1	0.2	10	11/6/98	11/9/98	8	J
Barium	EPA 3050B	6010B	1	0.6	2	11/6/98	11/10/98	67	
Beryllium	EPA 3050B	200 8	0.04	0.04	10	11/6/98	11/9/98	0.39	
Cadmium	EPA 3050B	200 8	0.04	0.04	10	11/6/98	11/9/98	0.26	
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5230	
Chromium	EPA 3050B	6010B	2	0.7	2	11/6/98	11/10/98	26	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	40	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	26600	
Lead	EPA 3050B	200 8	0.04	0.008	10	11/6/98	11/9/98	16.1	J
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	6420	
Manganese	EPA 3050B	6010B	1	0.4	2	11/6/98	11/10/98	263	
Mercury	EPA 3050B	7471A	0.2	0.02	1	10/19/98	10/21/98	0.2	
Nickel	EPA 3050B	200 8	0.5	0.04	10	11/6/98	11/9/98	18.2	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2200	
Selenium	EPA 3050B	200 8	2	0.6	10	11/6/98	11/9/98	ND	WJ
Silver	EPA 3050B	200 8	0.04	0.008	10	11/6/98	11/9/98	0.15	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	5870	J
Thallium	EPA 3050B	200 8	0.04	0.01	10	11/6/98	11/9/98	0.13	J
Tin	EPA 3050B	200 8	4	0.2	10	11/6/98	11/9/98	4	
Vanadium	EPA 3050B	6010B	2	0.6	2	11/6/98	11/10/98	67	
Zinc	EPA 3050B	6010B	2	0.8	2	11/6/98	11/10/98	66	

E

Estimated concentration, see case narrative

WGT/13/99

Approved By

1544Inc/031695

065K4IC P EAT Sample (14) 11/12/98

Date 11/12/98

00021  
FILE NO

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

**Client:** Roy F Weston, Inc  
**Project:** Duwamish River/4000-027-001-2019-38  
**Sample Matrix:** Sediment

**Service Request:** K9806584  
**Date Collected:** 9/23/98  
**Date Received:** 9/24/98

**Total Metals**

Sample Name	98394029	Units	mg/Kg (ppm)
Lab Code	K9806584-015	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	21300	
Antimony	EPA 3050B	6010B	10	5	2	11/6/98	11/10/98	ND	
Arsenic	EPA 3050B	200 8	1	0 2	10	11/6/98	11/9/98	8	
Barium	EPA 3050B	6010B	1	0 6	2	11/6/98	11/10/98	74	
Beryllium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 46	
Cadmium	EPA 3050B	200 8	0 04	0 04	10	11/6/98	11/9/98	0 26	J
Calcium	EPA 3050B	6010B	10	3	2	11/6/98	11/10/98	5540	
Chromium	EPA 3050B	6010B	2	0 7	2	11/6/98	11/10/98	27	
Cobalt	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	10	
Copper	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	42	
Iron	EPA 3050B	6010B	4	4	2	11/6/98	11/10/98	28000	
Lead	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	14 6	J
Magnesium	EPA 3050B	6010B	2	2	2	11/6/98	11/10/98	7040	J
Manganese	EPA 3050B	6010B	1	0 4	2	11/6/98	11/10/98	286	
Mercury	EPA 3050B	7471A	0 2	0 02	1	10/19/98	10/21/98	0 2	J
Nickel	EPA 3050B	200 8	0 5	0 04	10	11/6/98	11/9/98	19	
Potassium	EPA 3050B	6010B	400	400	2	11/6/98	11/10/98	2500	
Selenium	EPA 3050B	200 8	2	0 6	10	11/6/98	11/9/98	0 6	J
Silver	EPA 3050B	200 8	0 04	0 008	10	11/6/98	11/9/98	0 15	
Sodium	EPA 3050B	6010B	20	20	2	11/6/98	11/10/98	7530	
Thallium	EPA 3050B	200 8	0 04	0 01	10	11/6/98	11/9/98	0 08	
Tin	EPA 3050B	200 8	4	0 2	10	11/6/98	11/9/98	4	
Vanadium	EPA 3050B	6010B	2	0 6	2	11/6/98	11/10/98	73	
Zinc	EPA 3050B	6010B	2	0 8	2	11/6/98	11/10/98	69	

E

Estimated concentration, see case narrative

NET/13/98

Approved By \_\_\_\_\_  
 I:\44muc\031695  
 06584IC P FAI Sample (15) 11/12/98

JC

Date 11/12/98

00022